



*Apple IIc Imagewriter
User's Manual*

The Apple IIc



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The Imagewriter Tool Kit uses a machine language interface, and incorporates modules from "The Routine Machine" written by Peter Meyer and published by Roger Wagner Publishing.

Product Revisions

Apple cannot guarantee that you will receive notice of a revision to the software described in this manual, even if you have returned a registration card received with the product. You should periodically check with your authorized Apple Dealer.

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Warning

This equipment has been certified to comply with the limits for a Class B computing device, pursuant to Subpart J of Part 15 of FCC Rules. Only peripherals (computer input/output devices, terminals, printers, etc.) certified to comply with the Class B limits may be attached to this computer. Operation with non-certified peripherals is likely to result in interference to radio and TV reception.



The Apple IIc

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User's Manual
Part I: Guide To Apple IIc*

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Radio Frequency Interference Statement

The equipment described in this manual generates and uses radio-frequency energy. If it is not installed and used properly, that is, in strict accordance with our instructions, it may cause interference with radio and television reception.

This equipment has been tested and complies with the limits for a Class B computing device in accordance with the specifications in Subpart J, Part 15, of FCC rules. These rules are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that the interference will not occur in a particular installation, especially if you use a "rabbit ear" television antenna. (A "rabbit ear" antenna is the telescoping-rod type usually contained on TV receivers.)

You can determine whether your computer is causing interference by turning it off. If the interference stops, it was probably caused by the computer or its peripheral devices. To further isolate the problem:

- Disconnect the peripheral devices and their input/output cables one at a time. If the interference stops, it is caused by either the peripheral device or its I/O cable. These devices usually require shielded I/O cables. For Apple peripheral devices, you can obtain the proper shielded cable from your dealer. For non-Apple peripheral devices, contact the manufacturer or dealer for assistance.

If your computer does cause interference to radio or television reception, you can try to correct the interference by using one or more of the following measures:

- Turn the TV or radio antenna until the interference stops.
- Move the computer to one side or the other of the TV or radio.
- Move the computer farther away from the TV or radio.
- Plug the computer into an outlet that is on a different circuit than the TV or radio. (That is, make certain the computer and the radio or television set are on circuits controlled by different circuit breakers or fuses.)
- Consider installing a rooftop television antenna with coaxial cable lead-in between the antenna and TV.

If necessary, you should consult your dealer or an experienced radio/television technician for additional suggestions. You may find helpful the following booklet, prepared by the Federal Communications Commission:

"How to Identify and Resolve Radio-TV Interference Problems"

This booklet is available from the U.S. Government Printing Office, Washington, DC 20402, stock number 004-000-00345-4.

About This Manual



Welcome to the Imagewriter manual for the Apple IIc. To make it easier to use, this manual is divided into two distinct parts, Part I and Part II. Part I pages have a red edge, and Part II pages have a gray edge.

Part I is for everyone. Part II is for experienced users.

Part I: User's Guide, is the only part of the manual that most users will need. Part I provides all the information you need to set up your Imagewriter and start printing.

Part II: Reference, contains a great deal of reference material for the experienced user or programmer who may need to write or modify programs in order to take advantage of some of the advanced features of the Imagewriter. Either the Table of Contents or the Index provides you with a quick means of locating desired information in Part II.

What Your Imagewriter Can Do

You can print both words and graphics.

Your Imagewriter can print anything a typewriter can, and more. Given the proper commands, it can underline text, print in boldface, output graphics, or mix more than one typeface in a given document.



How To Use This Manual

The following is a brief outline of the contents of this manual:

Part I: User's Guide

- For a description of Imagewriter controls and parts, read Chapter 1.
- Follow the instructions in Chapter 2 to load paper and ribbon, to run a built-in test on the Imagewriter, and to connect it to your Apple IIc.
- In Chapter 3 you start printing and check your setup.
- Chapter 4 demonstrates the graphics capabilities of your Imagewriter.
- Chapter 5 gives you helpful suggestions for keeping your Imagewriter in good working order.

Part II: Reference

- Chapter 1 provides some examples of printing with Applesoft and Pascal.
- Chapter 2 describes the use of the Imagewriter Tool Kit.
- Chapters 3 and 4 describe Imagewriter control codes.
- Appendix A gives troubleshooting suggestions, and Appendixes B through F provide additional program and firmware information.

Part II, Reference, is not needed for running pre-packaged programs. The primary purpose of Part II is to aid experienced users or programmers in writing or modifying programs that use the advanced Imagewriter features.

Who Should Read What

The following chart recommends chapters and appendixes for various types of readers. You may be a combination of types (for example, you may be a first-time user setting up your own system).

READER	PART I USER'S GUIDE					PART II REFERENCE									
	Chapters					Chapters				Appendixes					
	1	2	3	4	5	1	2	3	4	A	B	C	D	E	F
Person setting up the system	•	•	•							•					
First-time user wanting to use already connected system with pre-packaged programs	•		•		•										
Experienced Apple computer user	•	•	•	•	•	•	•	•		•	•			•	•
Programmer	•	•	•			•	•	•	•		•	•	•		

Aids to Understanding

Look for these visual aids throughout the manual:

By The Way: Gray boxes contain sidelights or interesting pieces of information. Read the boldface tag to decide if you want to read the box.

Important! Gray boxes like this contain important information.



Warning

Warning boxes like this direct your attention to something that could damage either software or hardware. They also are used to alert you to important safety precautions.

Look for helpful notes in the margins.

FYI means *for your information*.

Marginal notes are used occasionally to summarize the main point of an adjacent paragraph.

You'll also notice that some information is labeled **FYI** and is in italics. This information is optional reading—it's related to the information in the main text, but it's not vital to your understanding.

Imagewriter Controls and Parts



First a Few Names

Before proceeding further, you should take a minute to learn the names of your Apple Imagewriter's controls and parts. With your Imagewriter unpacked and sitting on the table in front of you, compare it with the labeled pictures.

Exterior Features

Figures 1-1 through 1-3 show the main external parts of the Imagewriter.

Figure 1-1. Front View

Paper Cover

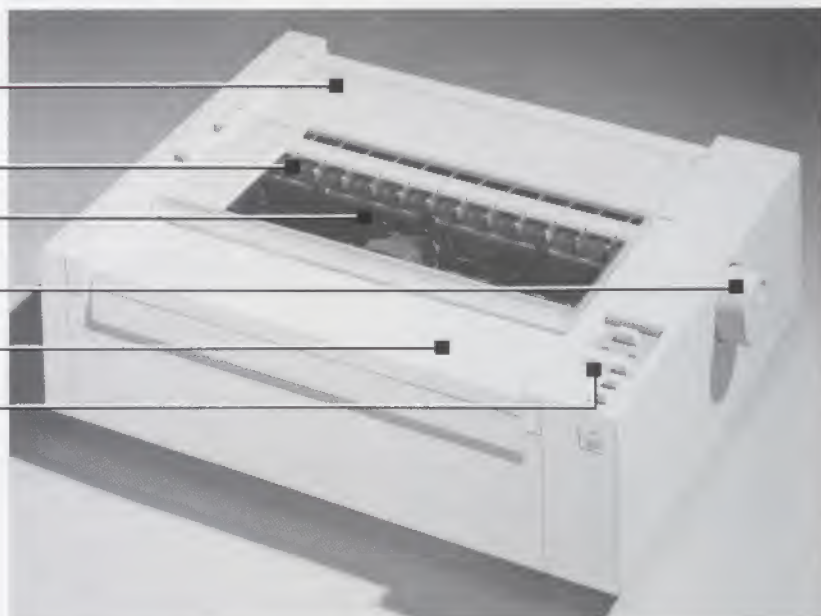
Platen

Roller Shaft

Platen Knob

Carrier Cover

Control Cluster



CONTROL CLUSTER:

Contains the Imagewriter controls and indicators. These are described later in this chapter.

PLATEN:

The platen is used to:

- roll paper forward in the friction feed mode.
- provide a back support for the paper to rest against.

PLATEN KNOB:

Used to turn the platen when manually loading paper.

ROLLER SHAFT

Holds paper against the platen.

The procedure for loading paper is described in Chapter 2, "Setting Up Your Imagewriter."

PAPER COVER:


Provides access for loading pin-feed paper, and prevents such things as dirt and paper clips from getting into the printer.


CARRIER COVER:

Provides access for changing the cassette ribbon, and also prevents such things as dirt and paper clips from getting into the printer.

The printer will not operate unless the carrier cover is completely shut.

PAPER RELEASE LEVER

Releases platen friction when set in pin-feed position , the position used for pin-feed paper.

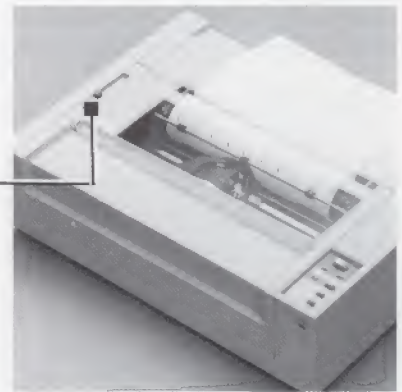
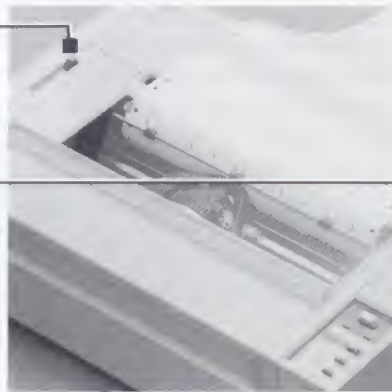
Applies platen friction when set to friction position , the position used for ordinary paper with no pin-feed holes.

The use of the paper release lever is described in Chapter 2, "Setting Up Your Imagewriter."

Figure 1-2. Paper Release Lever Positions

Paper Release Lever
Pin Feed Position
(Lever to the Rear)

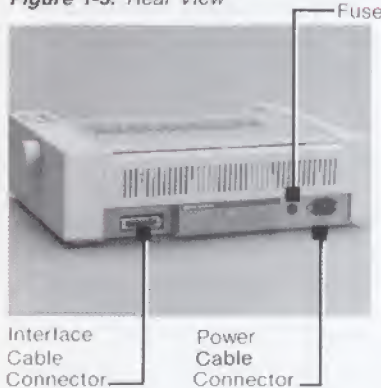
Paper Release Lever
Friction Position
(Lever to the Front)



Warning

Don't touch the platen knob or paper release lever while the Imagewriter is printing.

Figure 1-3. Rear View



INTERFACE CABLE
CONNECTOR: ---

Connector for Interface Cable that connects the Apple IIc to the Imagewriter.

POWER CABLE
CONNECTOR: ~

Connector for power cable.

You will use the interface connector cable to connect the Imagewriter to your Apple IIc and will also connect the power cord to the Imagewriter, as described in Chapter 2, "Setting Up Your Imagewriter."

FUSE

Provides over-current protection for the Imagewriter.

Controls and Indicators

You can operate your Apple Imagewriter entirely from your Apple IIc, but for convenience some control buttons and associated indicator lights are provided on the printer itself. Figure 1-4 shows the Imagewriter controls and indicators.

Note: All switch buttons in the control cluster alternate between two modes. Each time you press the button, the printer changes to the other mode. For example, the ON/OFF switch goes between on and off.

Warning

Do not attempt to plug in or operate your Imagewriter until you are ready to perform the built-in test described in Chapter 2, "Setting Up Your Imagewriter."

Figure 1-4. Control Cluster, Controls and Indicators



ON/OFF button:

Press to turn the printer on or off.

POWER light:

Turns on (green) when the printer is plugged in and the ON/OFF switch is on.

SELECT button:

Press to select or deselect the printer.

SELECT light:

Turns on (green) when the printer is selected.

When the light is on (printer selected) your printer can receive data from the Apple IIc. When the light is off (printer not selected) you can control the printer with its control cluster switches, but the printer can't receive data from the computer.

By The Way: If you open the carrier cover while the Imagewriter is printing, the SELECT light will go out and the Imagewriter will stop. To resume printing, close the cover tightly and press the SELECT button.



Warning

Do not press the SELECT button to make the Apple Imagewriter print when there is no paper under the type head. This will damage both the type head and the platen.

LINE FEED button:

This button works only when the SELECT light is off. Press it once to move the paper up a line.

If you hold the LINE FEED switch button down, the printer will supply five individual line feeds and then continue to feed paper until you release the button.

FORM FEED button:

This button works only when the SELECT light is off. Press once to feed a full page of paper.

If you have aligned the top of a page with the print head, this button will feed to the top of the next page. (Normal setup of Imagewriter is for 11 inch pages; this may be changed to 12 inches.) Pressing the FORM FEED button is also a handy way to move a printed page up so it is more convenient to tear off.

By The Way: You can stop printing by pressing the SELECT button so that the SELECT light turns off. This deselects the printer, stopping data transfer from the computer. The printer will print out until its buffer is empty and then stop. While it is stopped, you can operate the LINE FEED and FORM FEED buttons. (Commands from the computer will be ignored.) To resume printing from the place you stopped, press the SELECT button so that the SELECT light turns on.

PAPER ERROR light:

Turns on (red) just before the printer runs out of paper.

The light turns on when there is only about an inch of paper left in the printer, and the printer stops printing. If you want to print the next line or so anyway (to finish a form that is nearly done, for example), just press the SELECT button once for each additional line to be printed.

Replacing the ribbon cassette and loading paper are described in Chapter 2. Cleaning and lubrication procedures are provided in Chapter 5.

Inside Your Imagewriter

Normally, the only times you'll need to open your printer will be to replace the ribbon cassette and pin-feed paper, adjust for paper thickness (if you change to multi-part forms, for instance), or for cleaning and lubrication. You should leave service of the working parts of your Apple Imagewriter to a qualified technician.

The carrier cover and the paper cover, Figures 1-5 and 1-6, help prevent dust, dirt and stray objects from getting inside the printer, and ensure that nothing interferes with the moving parts while they are working. The printer will not operate unless the carrier cover is completely shut.



Warning

Before opening either the paper cover or the carrier cover, always be sure the POWER light is off. This is good practice, even though opening the carrier cover does stop the printer.

To locate the interior parts, remove the covers as explained in the text accompanying Figures 1-5 and 1-6. Then refer to Figures 1-7 through 1-9 which show the main interior parts.

Figure 1-5. *Carrier Cover, Removal*



1. Remove the carrier cover, Figure 1-5, by lifting its front edge and sliding the cover toward the front of the machine.

The entire cover comes off. The clear plastic lid is hinged to allow access to the inside when loading or adjusting paper. The lid is normally kept closed.

Figure 1-6. Paper Cover, Removal



2. Remove the paper cover, Figure 1-6, by holding it by the center and gently pulling up.

It should come up quite easily.

Figure 1-7. Imagewriter Interior

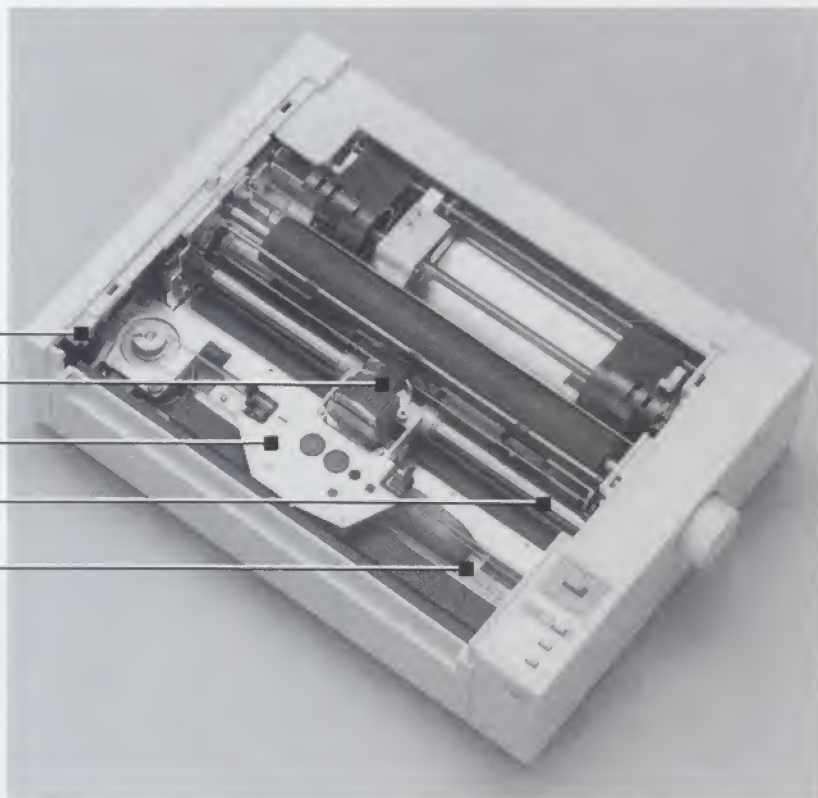
Interlock Switch

Type Head

Ribbon Cassette Deck

Carrier Track

DIP Switches



INTERLOCK SWITCH:

A magnetic switch that stops printer when carrier cover is not in place.

CARRIER TRACK:

The type head travels back and forth along this track.

DIP SWITCH ASSEMBLIES:

The two DIP switches (SW1 and SW2) are located on the right side of the carrier track.

The normal settings of DIP switches SW1 and SW2 are shown in Figure 2-12.



Warning

The two blue controls to the left of the DIP switch assembly should only be adjusted by a service technician. They control the strength of the printer impression and the alignment of the type head.

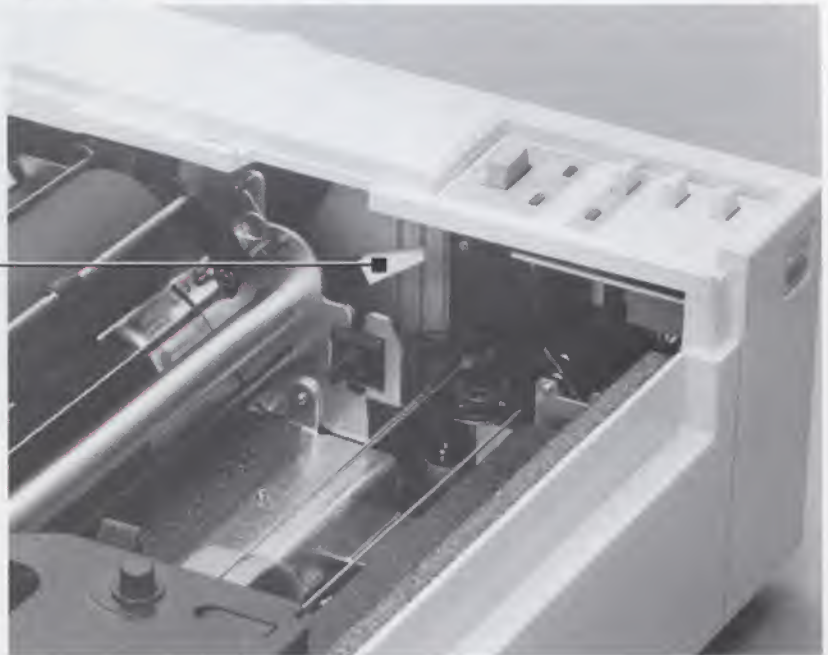
TYPE HEAD:

This is the dot matrix printing element that strikes the ribbon to print an image on the paper.

The type head sticks up through the ribbon cassette. It prints characters and graphics by the dot matrix method, in which each character or graphic image is formed by a pattern of dots.

Figure 1-8. Paper Thickness Lever

Paper Thickness Lever

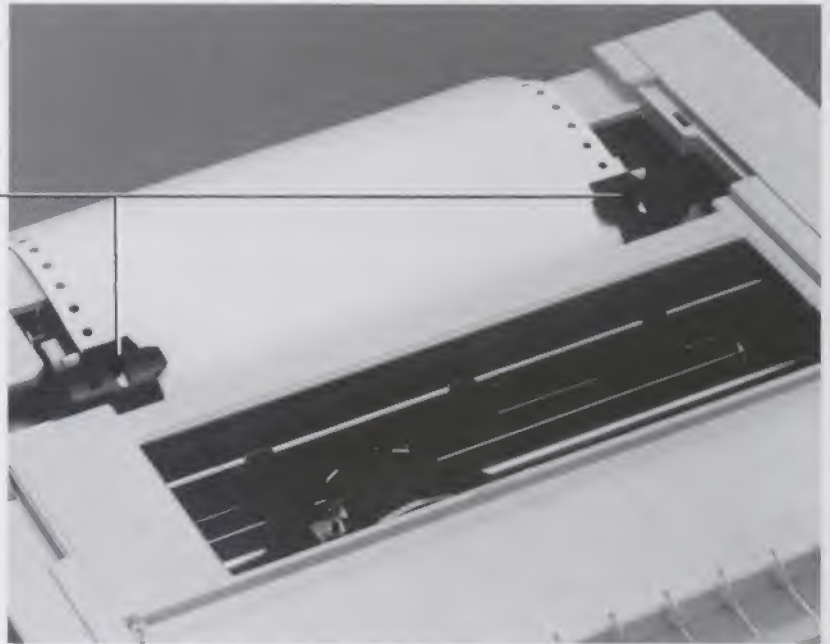


PAPER THICKNESS LEVER:

Adjusts the position of the platen with respect to the type head.

Figure 1-9. *Imagewriter Sprockets*

Sprockets



SPROCKETS:

Toothed wheels that move pin-feed paper through the printer.

You are now familiar with the main parts of the Imagewriter. In the next chapter you'll prepare your Imagewriter for use.

Setting Up Your Imagewriter



This chapter shows you how to get your Imagewriter up and running. You'll load the paper and ribbon, quickly check the setting of DIP switches SW1 and SW2, run the Imagewriter through a built-in test, and connect it to your Apple IIc.

Selecting the Proper Location

Your Apple Imagewriter works best in a clean, vibration-free environment, away from such hazards as chemical fumes and spilled coffee. It is small, so you can place it on a shelf or on top of a file cabinet, where it will be out of the way; or you can put it on the back of a desk or table, where it will be easy to reach. The principal limitation on its location is the six-foot cable which connects your Imagewriter to your Apple IIc.

If you will be using any kind of paper other than single sheets, you will need room for the paper supply that feeds into the back of the printer. A stack of pin-feed paper behind the printer will require a space of about 9 inches by 12 inches. You can also place the printer on a small stand on your desk with the paper under it, or place the printer at the back of a desk, shelf, or table, with the paper supply in a box on the floor.

For Best Results: Ask your dealer to show you the Apple Stacker stand, designed especially for the Apple Imagewriter. It organizes both your cables and your continuous-feed paper, keeping your work area uncluttered.

Loading Paper

You can use two common types of paper:

1. Single Sheets of Paper
2. Pin-Feed Paper

Variations of these paper styles are: ordinary bond paper, business forms, letterhead paper, labels, and multiple part forms. You may find it more convenient to use special *pin-feed paper* made specially for computer driven printers. With pin-feed paper you don't have to load individual sheets. Pin-feed paper is very convenient as it feeds automatically, and once the left edge of the paper is adjusted, it stays adjusted.

Choosing the Right Kind of Paper

The Apple Imagewriter prints on ordinary bond paper, up to 24-pound weight. (Standard pin-feed computer paper usually comes in 15- and 20-pound weights.) Heavier paper may not feed properly; lighter paper, such as onionskin, may give a poor print image unless it is backed by a sheet of 15-pound bond.

You can also use multiple forms in your printer, provided their total thickness (including carbon sheets) does not exceed 0.28 millimeter (0.011 inch), or about the thickness of four sheets of 15-pound bond. You'll have to adjust the printer when printing on more than one sheet (see Adjusting for Paper Thickness later in this chapter).

You can adjust your Apple Imagewriter to accept pin-feed paper of from 3 to 10 inches in overall width. This includes standard 9-1/2 inch-wide pin-feed paper, which produces 8-1/2 by 11-inch finished pages after you tear off the perforation strips. You can also use several standard sizes of pin-feed label stock, for jobs such as printing mailing labels. If you like, you can position the paper so that the Imagewriter prints right up to the perforation line on either side (but not both sides at once).



Warning

Never put paper with staples or paper clips in your Apple Imagewriter.

Note: The next two sections describe how to load pin-feed paper into your Apple Imagewriter. If you plan to use only single sheets of paper without pin-feed holes, skip ahead to the section called "Loading Plain Paper."

Setting the Pin-Feeder Width

The first time you use pin-feed paper in your Apple Imagewriter you will need to set the spacing of the *sprockets*. Here is how to do it:

Unless you switch to a different width of pin-feed paper, you only need to do this once.

Figure 2-1. Removing the Covers



Carrier Cover Paper Cover



On/Off Switch

Sprocket Release Lever

Left Paper Clamp (Closed)

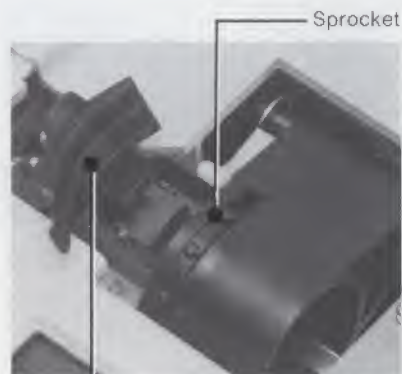
Paper Release Lever

Red Rings on Roller Sprocket

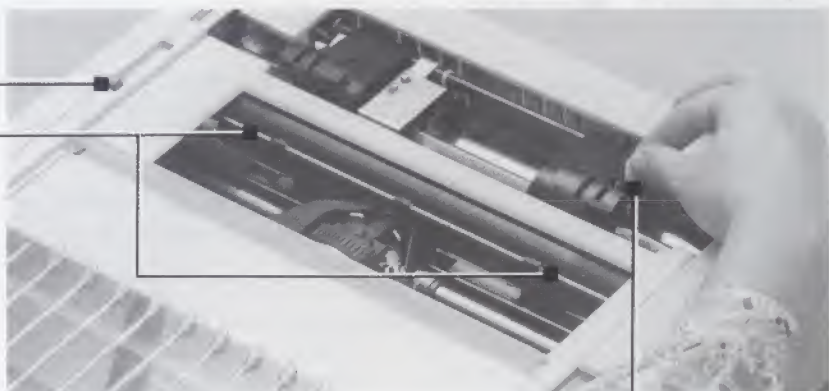
1. If the end of the paper you are going to use is not straight, tear it off at the nearest perforation.
2. Make sure the printer is off.
3. Remove both the carrier cover and the paper cover, Figure 2-1.
4. Open the sprocket paper clamps, Figure 2-2.

The sprockets are the two black plastic rollers with pins located inside the printer at the rear. Lift the hinged paper clamps, so they open up and swing outward.

Figure 2-2. Finding the Sprockets



Left Paper Clamp (Open)



White Sprocket Release Lever

5. Release the black sprockets by lifting the white release levers at the rear of each sprocket assembly.

The white sprocket release levers are on the side of each sprocket.

When the white levers are pushed toward the rear, the sprockets are free to slide along their square shaft. When the levers are forward, the sprockets are locked in place.


Figure 2-3. *Adjusting the Sprockets*



Hinged Paper Clamps in Place

6. Place the pin-feed paper over the sprockets and adjust the sprockets to the width of the paper.


7. Rotate the sprockets (by turning the platen knob) and position the paper so that the pins fit through the holes in the paper. Snap the hinged paper clamps back into place, Figure 2-3.

8. Set the paper release lever to the pin-feed (rear) position .



This allows the sprockets to push the paper around the platen.

9. Grasp the roller shaft at both ends and pull it forward.

10. Feed the forward end of the paper under the rubber platen and into the printer, as you would in a typewriter, by turning the platen knob clockwise.

11. Be sure that the paper release lever is still in the pin-feed (rear) position .

This releases friction on the paper so that you can easily move it.

- | | |
|--|--|
| <p>12. Now move the two sprockets sideways, carrying the paper with them, until the paper is centered with respect to the printing area (two red rings) Figure 2-2.</p> | <p>The two red rings at each end of the roller shaft tell you where the margins of an eight-inch printed line occur.</p> |
| <p>13. When the paper is in place, pull the paper release lever forward to the friction position  to hold it in place.</p> | <p>Push the roller shaft back against the paper.</p> |
| <p>14. Open the hinged paper clamp on each sprocket and push each of the white levers forward to lock the sprockets in place.</p> | <p>Make sure the sprocket pins fit easily in the holes in the paper, without pulling inward or outward.</p> |
| <p>15. Close the hinged sprocket paper clamps.</p> | <p>Again, check that the sprocket pins fit easily in the holes in the paper, without pulling inward or outward.</p> |
| <p>16. Move the paper release lever back to the pin-feed (rear) position .</p> | <p>The pin-feed position releases platen friction so that the pin-feed paper moves easily through the printer.</p> |

Loading Pin-Feed Paper

If you have just completed the previous section and your paper is already loaded, skip this section and go to "Setting the Top of the Page."

Follow these steps to re-load pin-feed paper into your Apple Imagewriter:

1. If the end of the paper you are going to use is not straight, tear it off at the nearest perforation.
2. Make sure the Imagewriter is off. Imagewriter POWER light should be off.


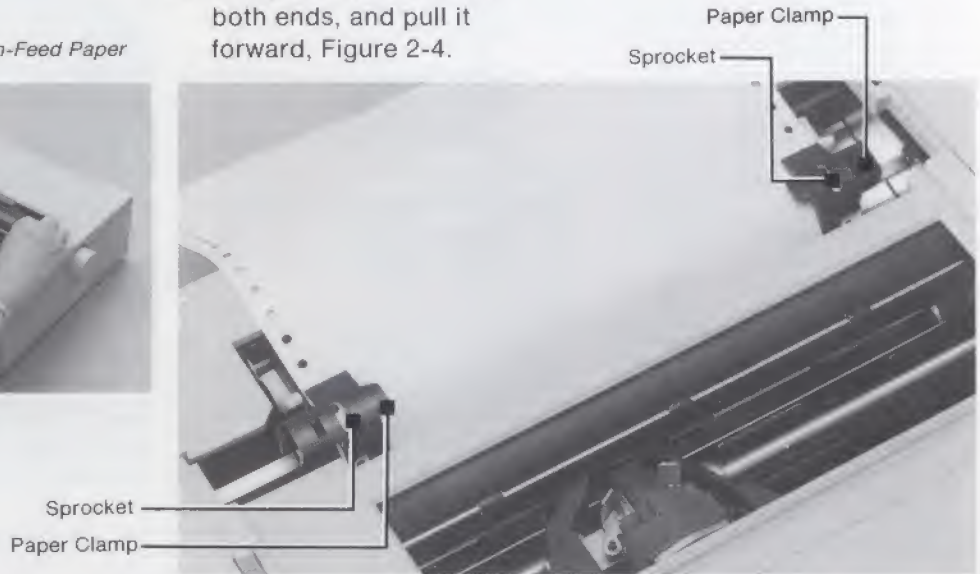
3. Remove both the carrier cover and the paper cover, Figure 2-1.
4. If necessary, set the pin-feeder width as just described.
5. Set the paper release lever to the pin-feed (rear) position .
6. Grasp the roller shaft at both ends, and pull it forward, Figure 2-4.

Figure 2-4. Loading Pin-Feed Paper



Roller Shaft



Sprocket

Paper Clamp

7. Lift the hinged paper clamps on the two black sprockets, folding them outward to expose the sprockets.
8. Place the paper over the sprockets so that the pins go through the paper holes. Snap the paper clamps back down to hold the paper in place.

9. Pull the pin-feed paper into the printer by turning the platen knob clockwise (top away from you), Figure 2-5.

Figure 2-5. Pin-Feed Paper Loaded

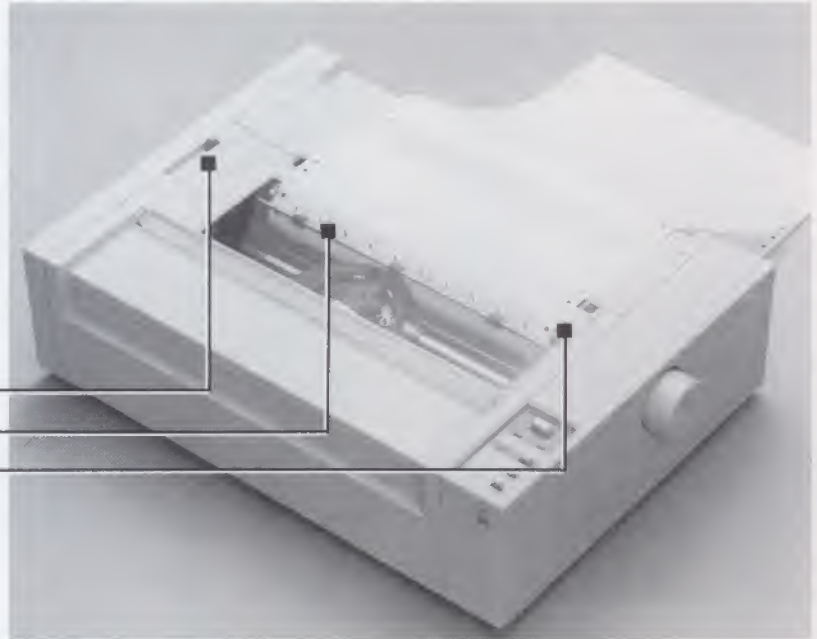



Platen Knob

Release Lever

Roller Shaft

Platen



10. When the end of the paper comes up at the front of the platen, under the type head, snap the roller shaft shut against the paper, Figure 2-5.
11. Check that the paper release lever is in the pin-feed (rear) position , Figure 2-5.
12. Replace the paper cover and the carrier cover.

13. Line up the first perforation with the top of the type head.

This sets the top of your page and the paper will advance to the next perforation when you press the FORM FEED button.


(Normal setup of Imagewriter is for 11 inch pages; this may be changed to 12 inches. The page length and lines per page setting of SW1-4 must match. For example, SW1-4 is set to 66 for 11-inch paper.)

Also, the SELECT light must be off in order for the FORM FEED button to work.

Instructions for checking the setting of DIP switches SW1 and SW2 are given later in this chapter.

Loading Plain Paper

To load paper without pin-feed holes, refer to Figure 2-6 and do the following:

1. Make sure the Imagewriter is off.
2. Open the clear plastic lid on the top of the Imagewriter.
3. Grasp the roller shaft by both ends, and pull it forward, Figure 2-6.
4. Set the paper release lever to the friction (front) position .
5. Push the end of the paper firmly down into the slot in the paper cover, so that it is snug against the platen.


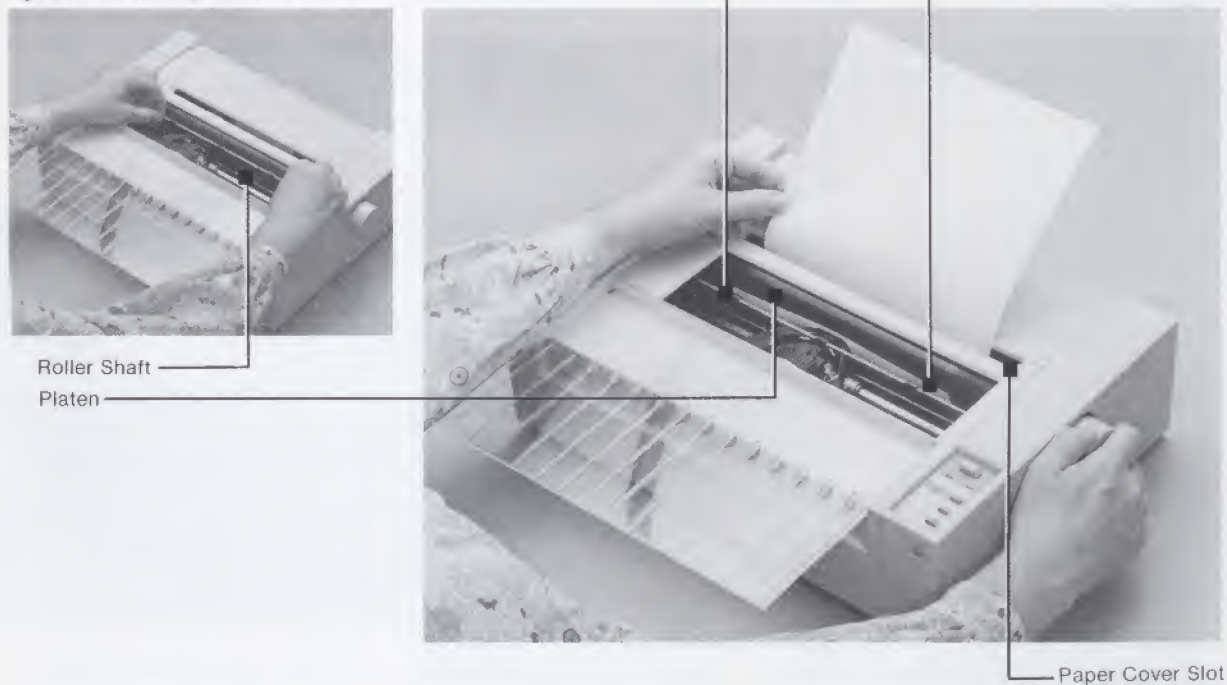

The friction  position (front) allows the platen to pull the paper through the Imagewriter.


Figure 2-6. Loading Plain Paper



6. Feed the paper around the platen as you would in a typewriter, by turning the platen knob clockwise to advance the paper.

To get the paper started feeding, it is helpful to continue to push down on the paper as you turn the platen knob.

7. Temporarily set the paper release lever to the pin-feed (rear) position .

The pin-feed  position releases most of the friction force against the paper so that the paper can easily be moved.

8. To align the paper exactly, you can pull the top edge of the paper up even with the bottom edge and move them together. To position the paper sideways, move it to the desired position with respect to the two red rings on the roller shaft.

The red rings on the roller shaft show the limits of the printer's line of type, Figure 2-6.


9. Snap the roller shaft shut, Figure 2-7.
10. Move the paper release lever to the friction (forward) position , and turn platen knob to move paper to desired position.

Figure 2-7. Plain Paper Loaded

Paper Release Lever

Roller Shaft



Setting the Top of the Page

When you press the FORM FEED button in the control cluster, the Apple Imagewriter feeds paper through to the top of the next page.

Pin-feed paper is perforated between pages, so pressing the FORM FEED button brings the paper to a handy place to tear it off.

By the Way: Your printer was set at the factory for a page length of 11 inches (66 lines). If you want to change the page length to 12 inches (72 lines), set SW1-4 to CLOSED. See "FYI: Imagewriter DIP Switch Settings," near the end of this chapter.

To position the top of form after you have loaded a new supply of pin-feed paper, make sure the power is off. Then simply turn the platen knob to bring the paper to the desired position. (Usually the top of the page should be level with the top of the type head.) Unless you turn the platen knob again or send control sequences to the printer to change the settings (instead of moving paper up by means of the LINE FEED button), the FORM FEED button will feed paper to the top of the next page each time you press it.

Adjusting for Paper Thickness

Your Apple Imagewriter will print higher-quality copies and give you longer service if you take care to adjust it to the correct thickness for the paper you are using.

1. Remove the carrier cover and look inside the printer. On the right side, near the platen knob, you will find a white plastic lever, Figure 2-8.

Figure 2-8. *Adjusting for Paper Thickness*

Paper Thickness Lever



2. Push the lever all the way back (toward the platen), to print on a single thickness of ordinary paper.
3. Push the lever all the way forward (toward the control panel), to print on a four-sheet multiple form.

As you move the lever back and forth you can see a slight movement of the horizontal metal carrier bar on which the type head slides, compensating for the paper thickness. You can also feel that it clicks into four positions, corresponding to one to four sheets of ordinary paper.

Loading Envelopes

To load an envelope, follow the same procedure as for plain paper. You may have to change the paper thickness adjustment. An envelope will normally require a setting equivalent to two sheets of paper.

Installing and Removing the Ribbon Cassette

The ribbon cassette supplied with your printer is a special type, made specifically for this machine. You can get additional ribbons from your Apple dealer.

Note: If you have not yet removed the cardboard retainer that held the typehead from moving during shipment, do so now.

Changing ribbons is fast and easy. To install the ribbon that was packed with your printer, do the following:

1. Make sure the power is off.
2. Remove the carrier cover.
3. Give yourself some working room by gently sliding the typehead toward the center of the carrier, Figure 2-9.
4. Take up slack in the ribbon by turning the knob on the cassette once or twice in the direction of the arrow.
5. Carefully slip the exposed portion of the ribbon between the black plastic ribbon guide and the thin metal ribbon guide plate (the part that nearly touches the paper). At the same time, guide the cassette downwards onto the ribbon deck, Figure 2-10.

The two black plastic cassette support tabs (the parts that stick up) fit into the notches on the sides of the cassette, Figure 2-11.

Figure 2-9. Changing the Ribbon

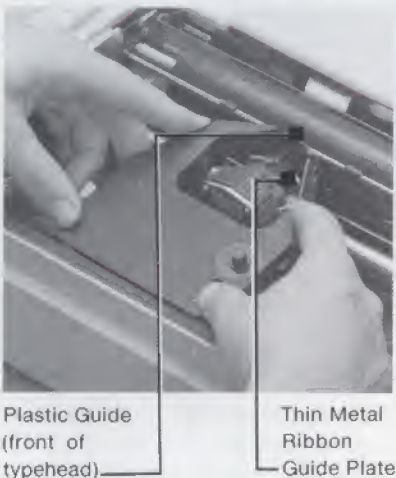


Figure 2-10. *The Ribbon Loaded*



The cassette should easily snap in place with a single motion. When it does, replace the carrier cover.

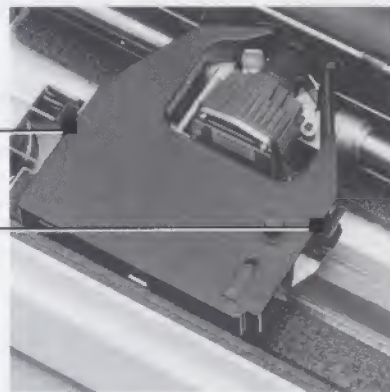
If the ribbon cassette refuses to go down completely, or if the ribbon is caught in the space between the ribbon guide and guide plate, turn the knob on the cassette slowly in the direction of the arrow as you seat it. When properly installed, the cassette should lie flat on the ribbon deck. It shouldn't take much force.

To remove a used ribbon cassette, turn off the power and remove the carrier cover. Gently spread the two black plastic cassette support tabs, Figure 2-11, and lift up the cassette.

Figure 2-11. *Removing the Ribbon*

Cassette Support Tab

Cassette Support Tab



Warning

When pulling the cassette away, be careful not to get the ribbon caught between the ribbon guide and the guide plate.

Testing Your Imagewriter

Inside your Imagewriter is a microprocessor with a permanent program that can print a test alphabet on command. The printer does not need to be connected to a computer to run this program. It is a handy way to put the machine through its paces before connecting it to your system.

To run the built-in test, follow these steps:

1. If you have not already done so, load paper and ribbon into the printer.
 2. Plug the printer into an electric power outlet and turn the printer on with the ON/OFF switch.
- The POWER light and SELECT lights should come on.



Warning

*All electrical connections to your computer and peripheral equipment **must be grounded!** Your Imagewriter is equipped with a three-prong power cord. As a safety feature, the plug is designed to fit only into a polarized, grounded three-hole outlet. If you don't have such an outlet, have a licensed electrician install one (and a grounding conductor, if necessary) where you will use your computer system. Do not defeat the purpose of the grounding plug.*

3. Press the SELECT button once to turn off the SELECT light.
4. Press the LINE FEED button a few times to make sure the paper feeds smoothly through the machine.
5. Turn the power off.

To stop the test, press the LINE FEED button.

6. Press the FORM FEED button and continue holding it in while you turn the power back on. Then release the FORM FEED button.

The Apple Imagewriter will print its complete set of characters repeatedly until you press the ON/OFF switch to turn the power off. It takes 16 lines to print the entire pattern.

7. Examine the print-out carefully.

All the characters should be complete (no dots missing) and neatly aligned. The lines should appear equally black from end to end. Spacing between characters and between lines should be even. If this is not the case, check for correct ribbon insertion, paper loading, and thickness settings. If the problem persists, please contact your Apple dealer.

Connecting the Imagewriter to Your Apple IIc

You need to read the beginning part of this chapter first.

The first part of this chapter explains how to set up your Imagewriter and prepare it for operation with your computer. If you haven't done so, read that before proceeding to connect the Imagewriter to the Apple IIc.

What You Need

To complete the installation of your Imagewriter you need the following items:

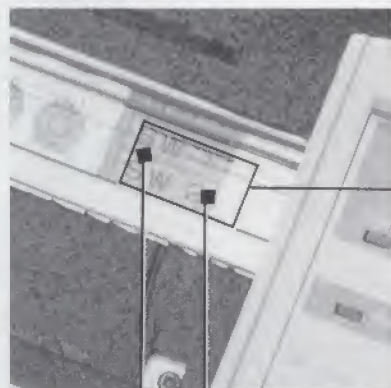
- Imagewriter Power Cord
- Imagewriter Interface Cable

About Your Cables: Your Imagewriter comes with a shielded interface cable to prevent radio and television interference.

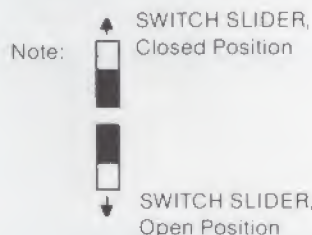
The Imagewriter Power Cord comes with the Imagewriter. The shielded Imagewriter Interface Cable is included in the Apple Imagewriter accessory kit for the Apple IIc.

Unless they have been changed, the switch positions as set at the factory should be as shown in Figure 2-12, and it should only be necessary to check them.

Figure 2-12. DIP Switches SW1 and SW2



DIP Switch Assembly 1 (SW1) DIP Switch Assembly 2 (SW2)



Imagewriter Setup and DIP Switch Check

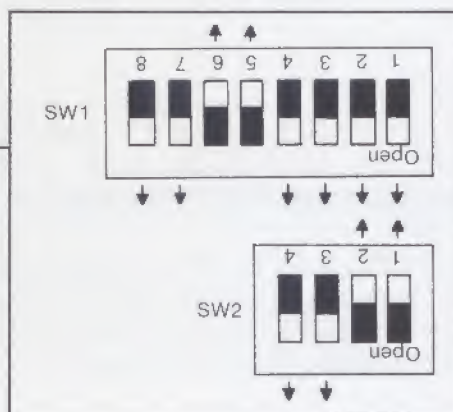
The Apple IIc sets itself up on power-on for normal operation of your Imagewriter. There are no special settings required on either your Apple IIc or your Imagewriter, except for checking the setting of DIP switches SW1 and SW2 on the Imagewriter. Therefore, installation can be completed in a very short time by just performing the following steps:

1. Be sure that the Apple IIc power is turned off, that any other attached equipment is turned off, and that the Imagewriter is turned off.
2. Check that Imagewriter switches SW1 and SW2 are set as shown in Figure 2-12.

If you haven't already done so, remove the carrier cover.

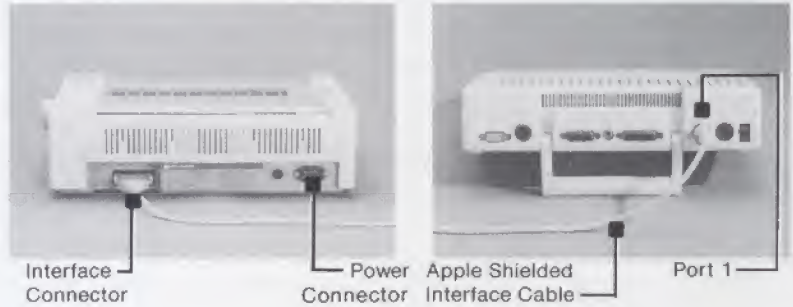
Should you have to change the setting of either DIP Switch SW1 or SW2 to make it match Figure 2-12, use something small like a round toothpick or small screwdriver. You shouldn't use a pencil or a pen, as residue from these objects could eventually damage the switch.

Once you are sure the switches are set correctly, replace the carrier cover.



3. Connect the D-shaped end of the printer's interface cable (the 25-pin end) to the interface connector on the back of your Imagewriter, Figure 2-13.
4. Connect the round end of the same interface cable (the 5-pin end) to Port 1 of your Apple IIc, Figure 2-13.
5. Plug the Imagewriter power cord into the Imagewriter and into a standard 110 VAC, 3-hole power outlet.

Figure 2-13. *Connecting Your Imagewriter*



Ready to Print

Your Imagewriter is all set up for printing. In the next chapter, you'll start printing using the Imagewriter with your Apple IIc.

FYI: Apple IIc Interface

When you turn on power to the Apple IIc, its printer serial port, Port 1, is automatically setup (configured) to communicate with the Imagewriter.

The System Utilities program disk for the Apple IIc uses a PIN (Product Identification-Number) system to simplify configuring the Apple IIc ports for various devices. The default setting for Port 1 of the Apple IIc is specifically set up for the Imagewriter with a PIN of 166/1124. The breakdown of the 166/1124 is as follows:

Apple IIc, Port 1 PIN		
Printer Mode	=	1
8 Data Bits and 2 Stop Bits	=	6
9600 Baud	=	6
No Parity	=	1
Don't Echo Output	=	1
Insert Line Feed after Carriage Return	=	2
Insert Carriage Return after 80 Characters	=	4

You may change the configuration of Port 1 (the printer serial port) on the Apple IIc, but at power-on, it always resets to the default values just described.

For information on configuring Port 1, the serial printer port of the Apple IIc, refer to the *Apple IIc System Utilities* and the *Apple IIc System Reference* manuals.

The SW1 and SW2 switch settings shown in Figure 2-12 are correct for normal operation of the Imagewriter with the Apple IIc. If you are a programmer and want to change these settings for special programs, refer to Part II, *Reference*, the back part of this manual.

Applesoft, AppleWorks, Apple LOGO, Apple Pascal, and most application programs are designed to work with the Imagewriter connected to Port 1 of the Apple IIc. If you want to use the Imagewriter with other programs you may need to reconfigure your Apple IIc. Refer to the appropriate software manual and consult your Apple dealer.

FYI: Imagewriter DIP Switch Settings

You do not need to go any further in this chapter unless you want to read about the function of DIP switches SW1 and SW2.

For use with the Apple IIc, the normal position of DIP switches SW1 and SW2 on the Imagewriter are as indicated in capital letters. These settings are the same as shown in Figure 2-12.

SW1-1	SW1-2	SW1-3	
OPEN	OPEN	OPEN	American
<i>Closed</i>	<i>Closed</i>	<i>Open</i>	<i>British</i>
<i>Open</i>	<i>Open</i>	<i>Close</i>	<i>German</i>
<i>Open</i>	<i>Closed</i>	<i>Closed</i>	<i>French</i>
<i>Closed</i>	<i>Open</i>	<i>Closed</i>	<i>Swedish</i>
<i>Closed</i>	<i>Open</i>	<i>Open</i>	<i>Italian</i>
<i>Closed</i>	<i>Closed</i>	<i>Closed</i>	<i>Spanish</i>
<i>Open</i>	<i>Closed</i>	<i>Open</i>	<i>American</i>

SW1-4	
OPEN	Page Length: 66 lines
<i>Closed</i>	<i>Page Length: 72 lines</i>

SW1-5	
CLOSED	Ignores 8th data bit, allowing reception of high ASCII as from Applesoft BASIC
<i>Open</i>	<i>Recognizes 8th data bit</i>

SW1-6	SW1-7	
<i>Open</i>	<i>Open</i>	<i>Pica (10 chars. per inch)</i>
CLOSED	OPEN	Elite (12 chars. per inch)
<i>Open</i>	<i>Closed</i>	<i>Ultracondensed (17 chars. per inch)</i>
<i>Closed</i>	<i>Closed</i>	<i>Elite proportional (144 dots per inch)</i>

SW1-8	
<i>Closed</i>	<i>Adds line feed after every carriage return</i>
OPEN	No line feed after carriage return

SW2-1	SW2-2	
<i>Open</i>	<i>Open</i>	<i>300 Baud</i>
<i>Closed</i>	<i>Open</i>	<i>1200 Baud</i>
<i>Open</i>	<i>Closed</i>	<i>2400 Baud</i>
CLOSED	CLOSED	9600 Baud

SW2-3	
OPEN	Data terminal ready
<i>Closed</i>	<i>XON/XOFF (not used by Apple IIc)</i>

SW2-4	
OPEN	(not used)

Starting to Print



This chapter contains instructions for checking your Apple IIc and Imagewriter setup. You will be using the Imagewriter to print from the Apple IIc's built-in Applesoft BASIC.

Preliminary Setup

Figure 3-1. System Connection



First, be sure that the Imagewriter and Apple IIc are connected correctly. (See Figure 3-1).

If you haven't done this, refer to the instructions in Chapter 2.

Be sure that the Imagewriter is loaded with paper and that a ribbon cassette has been installed.

If you haven't done this, refer to the instructions in Chapter 2.

Turning On the System

Figure 3-2. Imagewriter ON/OFF Switch



ON/OFF Switch

Perform the following steps to turn on the Apple IIc, Monitor, and Imagewriter:

1. Turn on the Imagewriter by pressing the ON/OFF switch. When you do, the POWER light comes on. (See Figure 3-2)

2. Turn on your monitor.

Figure 3-3. Apple IIc Power Switch



Power Switch

3. Turn on the Apple IIc by setting the power switch to 1. (Press the upper part of the switch.) See Figure 3-3.

If the power lights on the equipment do not turn on, check the power cable connections.

After the monitor warms up (in about 15 seconds) you should see the following display:

Apple IIc

Check Disk Drive

4. Ignore the Check Disk Drive message on the screen, and proceed to the next section, "Printing With Applesoft."

Important: The two printing examples in this chapter assume that no disks have been inserted in any of your Apple IIc drives. If you were using one or more disks, the two examples would be slightly different.

Printing with Applesoft

The following two procedures can be used to print with the Imagewriter.

Printing From the Keyboard

1. Press **CONTROL**-**RESET**.
(Both keys at the same time.)

You should see the following display.

```
Check Disk Drive  
]■
```

2. Ignore the message
Check Disk Drive
Type the word HOME, which
you will see displayed on
the screen as you type.
Press **RETURN**.

The screen will clear, and the Applesoft BASIC prompt and the flashing cursor will move to the top left of the screen.

```
]■
```

3. Type the following:
PRINT "HELLO"
Press **RETURN**.

You should see HELLO displayed on the screen.

4. Type the following:
PR#1
Press **RETURN**.

This directs the keyboard output to the printer.

5. Now type a few words, for example:
This is a test.
Press **RETURN**.

You won't see these words on the screen, but when you press **RETURN**, they will be printed on the Imagewriter.

You may also see an error message, SYNTAX ERROR, printed. Ignore this. This is just Applesoft BASIC's way of saying that this is not its normal way of operating.

6. Press **(RETURN)** again and return the keyboard output to the screen by typing:

PR#0

If you type a long enough line, Applesoft BASIC will output the entire line to the printer without waiting for you to press **(RETURN)**.

By The Way: The printing samples in this chapter are in the 40-column mode. For information of the 80-column mode and disk use, refer to the *Apple IIc Interactive Owner's Manual*, and your *Applesoft BASIC Programmer's Reference Manual*.

Printing From a Program

If you want to try something else, the following is a short program which you can run that will print first on the screen, then on the printer, and then back on the screen. This program is short, but typical of a straightforward BASIC printing routine.

1. Press **(CONTROL)-(RESET)**
(Both keys simultaneously).

2. Type HOME and press **(RETURN)**.

The screen will clear and the Applesoft BASIC prompt and flashing cursor will move to the top left corner of the screen.

3. Type the following program:

```
100 PRINT "Printing on Screen"  
110 PR#1  
120 PRINT "Printing on Imagewriter"  
130 PR#0  
140 PRINT "Printing on Screen again"  
150 END
```

Press **(RETURN)** at the end of each line.

4. Type RUN and press **(RETURN)** to run the program.

FYI: A Few Applesoft Hints

If you make an error typing in a line of the above program but haven't pressed (RETURN) yet, just use (Left Arrow) to backspace and retype the line from the point of the error.

If you make a typing error and discover it after pressing (RETURN), just type the line over again, being sure to repeat the same line number.

If you type a line you don't want, and discover it after pressing (RETURN), you can remove that line by just retyping only the line number and pressing (RETURN).

If your screen gets a little cluttered with replaced lines, just type HOME and press (RETURN) to clear your screen. Then type LIST and press (RETURN) to list all your current program lines.

If you want to clear the computer's memory of all program lines with one command, type NEW and press (RETURN).

You can find additional editing techniques in the Applesoft BASIC Programmer's Reference Manual.

If It Doesn't Work the First Time

Don't be discouraged if your Imagewriter doesn't print the first time. Just refer to the following hints to get it going.

Is the Imagewriter POWER light on? Check that your Imagewriter is plugged in and turned on. Press the ON/OFF switch to turn on the POWER light.

Is the fuse blown? If the POWER light doesn't come on, check the fuse. The fuse receptacle is right next to the power connector on the Imagewriter. If the wire inside the fuse is broken, replace with a 2-ampere type 3AG fuse.

Is the SELECT light on? The SELECT light must be on for the Imagewriter to print. If it isn't, press the SELECT button.

Is the carrier cover closed? If it is open, an interlock switch prevents the Imagewriter from printing and turns off the SELECT light.

Are you out of paper? When there is less than one inch of paper left, an error detector under the platen stops the printer. If you want to print a few more lines, you can override this switch for a few lines by pressing the SELECT button.

Are Imagewriter DIP switches SW1 and SW2 set correctly? See Chapter 2, "Connecting the Imagewriter to Your Apple IIc" (Setup and SW1/SW2 Settings).

Is the interface cable loose? Turn off power on both the Apple IIc and the Imagewriter. Remove and reinstall the Imagewriter interface cable.

Is the Apple IIc configured correctly? Turn the Apple IIc off and back on again. This resets Port 1 of the Apple IIc to its default configuration, which is correct for the Imagewriter.

Is the program at fault? Run the Imagewriter built-in-test. If the built-in-test runs all right, most likely the problem is in the program being run on the Apple IIc.

See also Appendix A, "Troubleshooting," for a more comprehensive list of troubleshooting aids. If the problem persists, consult your Apple dealer.

Summary

In this chapter you have checked out your Apple IIc and Imagewriter setup. If you are using pre-packaged programs, you are ready to run them. You should check with your Apple dealer to verify that these programs are compatible with your Apple IIc and Imagewriter.

Imagewriter Graphics



Printing a Graphics Picture

You can quickly take a look at your Apple IIc and Imagewriter graphics capabilities by using some of the functions of the Imagewriter Tool Kit Disk that comes with your Imagewriter accessory kit for the Apple IIc.

Programmers Note: This chapter only touches on the functions of the Imagewriter Tool Kit Disk. If you wish to do some of your own programming, Chapter 2 in Part II of this manual gives a further description of the Imagewriter Tool Kit functions, including the use of alternate type styles. Part II also contains a full description of the Imagewriter's advanced text printing commands to enable you to modify or write your own programs.

You'll need the Imagewriter Tool Kit Disk for Apple IIc which comes with the Imagewriter accessory kit for the Apple IIc. Proceed as follows:

1. Turn the Imagewriter on by pressing the ON/OFF switch so that the POWER light comes on.
2. Turn on your Monitor .
3. Insert the Imagewriter Tool Kit Disk for Apple IIc in the Apple IIc internal disk drive and close the door.

4. Turn on the Apple IIc by setting the power switch to 1. (Press down on the upper half of the switch.)

If your Apple IIc is already on, insert the Imagewriter Tool Kit disk in the internal drive and close the door. Then press **(⌘)-(CONTROL)-(RESET)** (all three keys at the same time).

When the drive stops and its light goes out, you'll see the following on your monitor screen:

```
IMAGEWRITER TOOL KIT
COPR 1984 APPLE COMPUTER
-----
```

MAIN MENU

- 1 - LOAD GRAPHIC IMAGE
- 2 - SHOW GRAPHIC IMAGE
- 3 - CHANGE PRINT OPTION
- 4 - PRINT GRAPHIC IMAGE
- 5 - DOWNLOAD SUBSCRIPT/SUPERSCRIPT
- 6 - QUIT IMAGEWRITER TOOL KIT

```
-----
ENTER A NUMERIC SELECTION, OR USE THE
ARROW AND RETURN KEYS
```

5. Choose 1 - LOAD GRAPHIC IMAGE. You can do this either by moving the cursor with the Apple IIc arrow keys, or by pressing the **(1)** followed by **(RETURN)**.

The Apple IIc will give you the following display:

IMAGEWRITER TOOL KIT
COPY 1984 APPLE COMPUTER

SELECT GRAPHIC IMAGE

- 1 - LOAD USER IMAGE
 - 2 - CHANGE PRODOS PREFIX
 - 3 - CATALOG CURRENT DRIVE
 - 4 - APPLE IMAGEWRITER
 - 5 - SHAKESPEARE
 - 6 - EINSTEIN
 - 7 - DOUBLE BESSEL FUNCTION
 - 8 - DIP CHIPS
-

ENTER A NUMERIC SELECTION, OR USE THE
ARROW AND RETURN KEYS
ESC - RETURN TO MAIN MENU

6. Select any sample graphics image (4 through 8) to load into the Apple IIc. For example, select number 4, the Imagewriter picture, by moving the arrow keys or by pressing (4) followed by (RETURN).

The built-in disk drive will whirl as the Apple IIc loads your selection. The screen will return to the main menu:

IMAGEWRITER TOOL KIT
COPY 1984 APPLE COMPUTER

MAIN MENU

- 1 - LOAD GRAPHIC IMAGE
 - 2 - SHOW GRAPHIC IMAGE
 - 3 - CHANGE PRINT OPTION
 - 4 - PRINT GRAPHIC IMAGE
 - 5 - DOWNLOAD SUBSCRIPT/SUPERSCRIPT
 - 6 - QUIT IMAGEWRITER TOOL KIT
-

ENTER A NUMERIC SELECTION, OR USE THE
ARROW AND RETURN KEYS

7. Choose item 2 - SHOW GRAPHIC IMAGE. Your screen will fill with a picture of the Imagewriter.
8. Press **[ESCAPE]**. Your screen will return to the main menu.
9. Choose 4 - PRINT GRAPHIC IMAGE, by typing **[4]** and pressing **[RETURN]**. Your Imagewriter will print a picture of itself.
10. Choose 3 - CHANGE PRINT OPTION, by typing **[3]** and pressing **[RETURN]**. Your Apple IIc will show the following screen display:

IMAGewriter TOOL KIT
COPY 1984 APPLE COMPUTER

CHANGE PRINT OPTIONS

- 1 - SINGLE SIZE - NORMAL
 - 2 - SINGLE SIZE - INVERSE
 - 3 - DOUBLE SIZE - NORMAL
 - 4 - DOUBLE SIZE - INVERSE
-

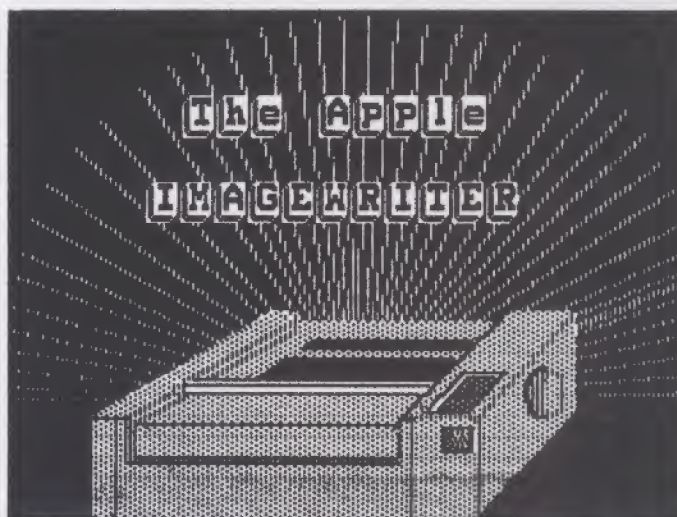
ENTER A NUMERIC SELECTION, OR USE THE
ARROW AND RETURN KEYS
ESC - RETURN TO MAIN MENU

11. Select an option, 1 - 4, and press **[RETURN]**. Apple IIc will return to the main menu.
12. Select 4 - 8 from the main menu. For example, select "4" to print the Imagewriter picture again. It will be printed according to your print option selection.
13. Press **[ESCAPE]** one or more times to return to the main menu.
14. Repeat steps 5 through 12, as desired, to try out the different print options.

For more advanced operations, refer to Chapter 2 in Part II of this manual for detailed instructions on the use of the Imagewriter Tool Kit Disk.

Can't Escape? In case you find yourself in a position where **(ESCAPE)** doesn't get you where you want to go, you can always get back to the main menu by pressing **(⌘)-(CONTROL)-(RESET)**. (All three keys must be pressed at the same time.)

Figure 4-1. Sample Imagewriter Graphics



Caring for Your Imagewriter



Think of your Apple Imagewriter as a high-quality typewriter with a built-in microprocessor. By taking care of it as you would any other fine machine, you will save yourself repair bills and always be assured of getting the results the Imagewriter was designed to deliver.

Operating Environment

The Apple Imagewriter is intended to be used in a reasonably clean indoor location. It will work reliably in temperatures from 41 to 104 degrees Fahrenheit (5 to 40 degrees Celsius) with 10 to 85 percent humidity.

Warning

When you're not using your Imagewriter you can store it at temperatures of -13 to +140 degrees Fahrenheit (-25 to +60 degrees Celsius) without damage, but never try to run it at these extremes.

The Imagewriter's covers protect it adequately from dust and foreign objects, but they afford little protection against liquids or vapors. Spilling any liquid inside, or allowing the printer to be exposed to chemical or solvent fumes (including steam from a coffee maker), can harm it.

External Care

To clean the outside of the Imagewriter, just wipe it with a soft damp cloth. To remove stains or dirt, add a drop of liquid dish detergent to the cloth and wipe the surface of the printer.

Warning

Never use household cleansers, ammonia, powders, abrasives, or solvents such as cleaning fluid on the outside of the printer; they may damage the plastic.

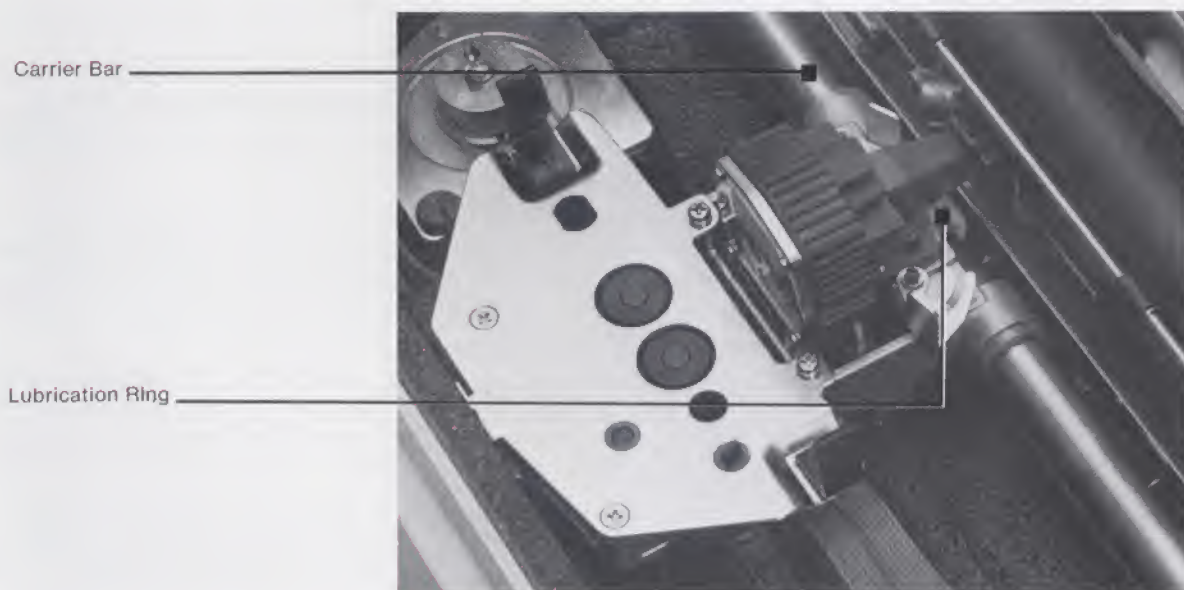
Internal Care

Under normal use, a yearly cleaning of the carrier bar and a light oiling of the lubrication ring is recommended, Figure 5-1. Under more frequent use, cleaning and oiling should be done more often.

1. With the power off, remove the carrier cover.
2. Remove the ribbon cassette.
3. Look underneath the type head, Figure 5-1.

You will see a white felt ring encircling the horizontal metal carrier bar. This is the lubrication ring. As the type head moves back and forth, oil soaked into this felt ring rubs off on the carrier bar.

Figure 5-1. *Lubrication Ring and Carrier Bar*



4. Carefully wipe the shaft clean, using a cloth that will not leave lint behind.

If necessary, you can use a small amount of isopropyl alcohol on the cleaning cloth for stubborn areas of film or dirt.

To perform the built-in test, turn the Imagewriter off. Then hold the FORM FEED button down and turn the printer back on. Release the FORM FEED button. To stop the test, press the ON/OFF switch again.

5. Put two or three drops of light machine oil, such as a sewing machine oil, near the top of the felt ring.

Do not use electric motor oil or any lubrication that contains rust inhibitors. Be careful not to get oil on other parts of the mechanism.

6. Replace the ribbon cassette and carrier cover.

7. Finally, after you have everything in place, run the Imagewriter's built-in test for a few lines of print.

This will spread the new oil over the shaft.



Warning

Be sure to load some paper in the Imagewriter before running the built-in-test.

Repacking

If you should have to ship or store your Imagewriter in the future, the original shipping carton makes the best container. To repack the Imagewriter, follow these steps:

1. Make sure the power is off.
2. Before repacking, gently move the printer's type head to the center of the carrier.
3. Remove the power cable, connecting cables, and ribbon cassette. Pack them separately in envelopes or plastic bags.
4. Place the cardboard type head protector inside the printer over the type head.
5. Close all covers securely and tape them down.

6. Place the entire printer in its plastic bag.
7. Place the foam forms on each end of the Imagewriter, and gently lower it (in its plastic bag) into the carton.
8. Put the ribbon cassette and power cable in the box on top of the printer.
9. Store the connecting cable and manual in the accessory kit.

That's all there is to keeping your Imagewriter humming happily along year after year.



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